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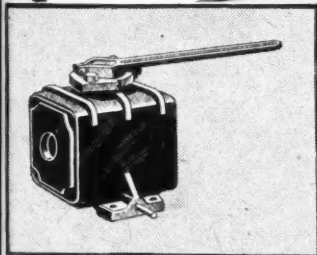
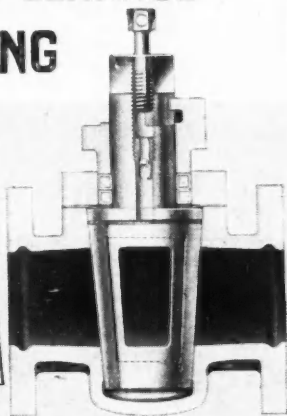
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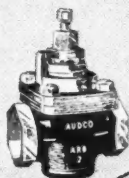
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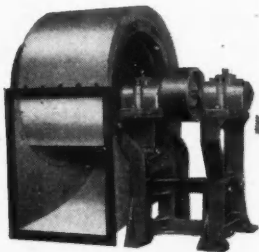
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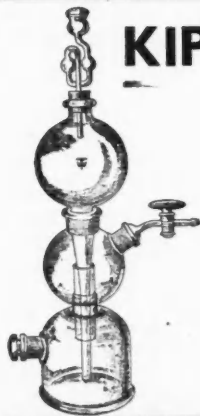
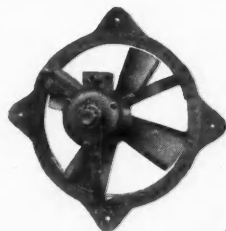
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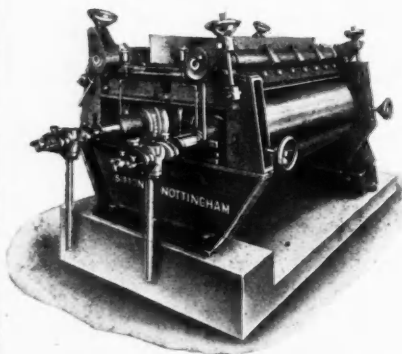
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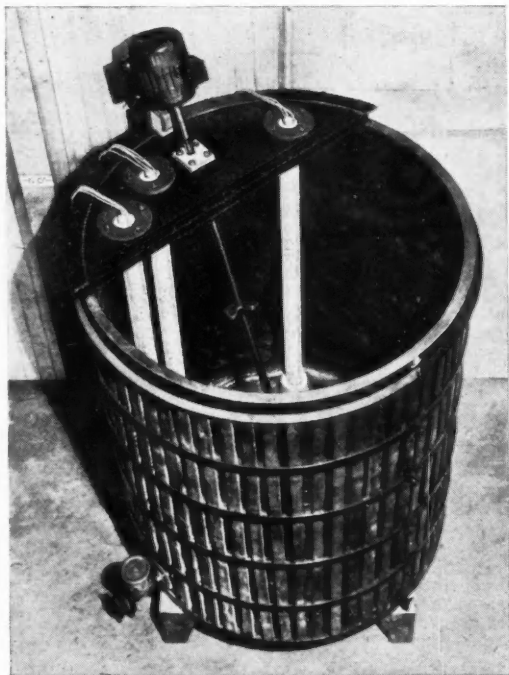
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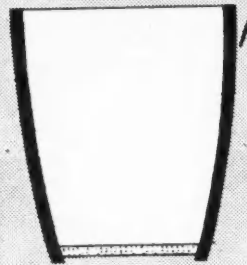
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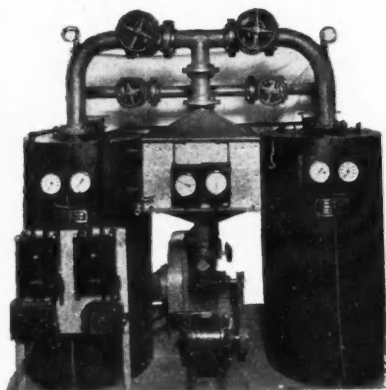


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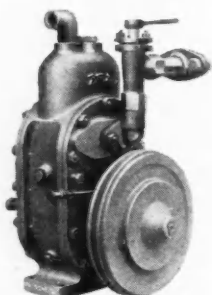
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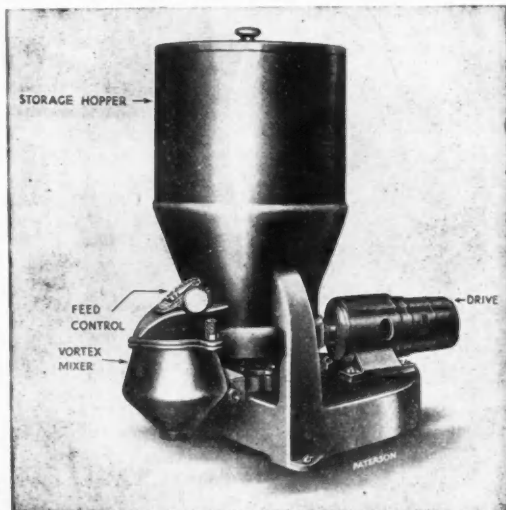
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February 27, 1943

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The Government's Policy

DURING the depression of 1929-32 a friend of ours was compelled by circumstances to resign his position. It was a high position with a comfortable standard of living and we asked him what he proposed to do. He replied that according to the economic principles of his grandfather he ought to cut down his establishment, take a much smaller house, and live on a greatly reduced scale; but that actually he proposed to do nothing of the sort. On the contrary, he would not reduce his standard of living, but would adventure afield in such a way as to make up for what he had lost. This was a bold step, and, frankly to our surprise, it succeeded. As we have pointed out in recent leading articles in THE CHEMICAL AGE this country after the war will be in very much the same position as our friend. There is no need to go over the familiar ground again, but, with much reduced assets and little foreign trade left, we shall have to face the world.

In these circumstances, by Victorian standards, we ought to reduce our standard of living and to adopt a régime of extreme parsimony. Speeches made in the House of Commons by Sir Kingsley Wood and Mr. Hugh Dalton have shown that the

Government proposes to do nothing of the sort, and in our opinion they are perfectly right. The advance of science and technology, the development of business and mass production, have enabled production per unit of man-power employed to be raised to such stupendous heights that there is plenty of everything for everyone in the world if we can adjust our financial system to the new conditions promoted by industry and invention and research. There is no reason why we should not live in the immediate future in an era of expanding trade and great prosperity. We must work, admittedly, for we have no investments on which we can live in idleness; but that will be no great hardship to a generation which has lived through such stirring times as we have seen during the last 30 years.

The Government's policy has for its basic objective the active employment of all the people of this country and its main problem is so to direct the demand for goods and services as to secure an orderly recovery of our economic life. The first step that will be taken apparently is one of stabilisation. This will mean the control of raw materials, of imports, and of issues of capital in such a way as to concentrate industry on

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those developments which are nationally most important. It would also mean control of prices, and the Government believes that it will be possible for the general price level to settle down at a figure not far different from what it is now. The loss of our investments and assets must be compensated for mainly by considerable expansion of exports, and our standard of living will depend on the extent to which our export trade can be fostered. For the time being it is clear that we must give priority to export trade over home needs. As a long-term policy, therefore, the Government is looking to an expansion of trade, the avoidance of major price swings, the setting up of an international monetary mechanism which will serve the requirements of international trade, and perhaps some international organisation for assisting international investment for development.

It is evident that the technical man is about to come into his own because, as Sir Kingsley Wood has stated: "Capital, management, and labour must turn to the new products developed as a result of war-intensified advances and regain our technical leadership through research and efficiency. The Government will contribute by their general policy in regard to foreign affairs, their promotion of export trade, their internal financial policy and the economic development of social policy." In pursuance of this plan the Government, through the Board of Trade, has asked industry to state what are likely to be the main obstacles to the restoration of full activity within a year or less after the cessation of hostilities, and what assistance they require in overcoming these obstacles. The Board of Trade has also inquired what would be the probable condition of equipment after the war, and how far modernisation of plant on a considerable scale will be necessary. Finally, industry has been asked what new products have been developed and what new varieties of existing products or completely new products can be placed on the market.

This is encouraging. The Twentieth Century will probably be known to history as the century of research and of technical development. The Government has evidently recognised the power of research, and it is now hoped that

the country as a whole will recognise the importance of technical men not only in the productive work of industry, but equally in its higher councils. Over 150 years ago Burke uttered these words: "Our ancestors have turned a savage wilderness into a glorious Empire; and have made the most extensive and the only honourable conquests, not by destroying, but by promoting the wealth, the number, the happiness of the human race." What our ancestors did can be repeated tenfold by the technical and scientific achievements of our day if the technical man is given free scope.

Mr. Dalton said that he considered that we must sell our goods at a profit, and that we must compete against other nations in regard to quality and price. He did not for a moment accept that the way to make our export trade efficient was to cut wages and reduce standards. He was hopeful that well before the end of the war there would have been devised a satisfactory arrangement for an international agreement, in the terms of the 'Mutual Aid Agreement, with all like-minded nations who desired the expansion of production, employment, exchange, and consumption of goods. He mentioned the Wheat Agreement and said it was the Government's intention in due course to enter into other agreements on the same lines. The announcement from time to time in our news columns of the formation of committees — sometimes international, sometimes with more restricted scope — to co-ordinate the affairs of various sections of the chemical and metallurgical industries is a further indication of the intention to pool ideas with a view to raising the technological and practical efficiency of the trades concerned.

Clearly a combination of high efficiency at home with international action between governments can do much to set the world to rights. We in this country, faced with the difficult position outlined earlier in this discussion, can only do our best to raise the standard of living throughout the world and so by helping others to help ourselves. All of us, politicians, economists, business men, technologists, and scientists, must say with Burke: "Applaud us when we run; console us when we fall; cheer us when we recover; but let us pass on—for God's sake, let us pass on!"

NOTES AND COMMENTS

Research Co-ordination

IT seems possible that the endowment of industrial scientific research in this country is at last coming into its own; but it is still a long way from being effectively co-ordinated. No doubt the reports of research institutions read rosily—the achievements are included, whereas the failures are left unrecorded—yet a glance at the latest annual report of the Armour Research Foundation (for the year 1941-42), Chicago, has filled us with envy, even after making all the necessary allowances. How many times have we been asked for the possible source of a rare chemical product, or a chemical product that has become rare as a result of the war? We should not like to give a categorical answer, nor to assess the amount of time we have spent in trying to secure a satisfactory answer, sometimes without success. In the Armour Institute they have a National Registry of Rare Chemicals with a central information file through which a scientific worker can learn the whereabouts of some urgently-needed chemical not listed in ordinary catalogues. The work is done free, in the national interest, and in cases where the supplier wishes to remain anonymous, the Institute transmits the actual chemicals.

A House of Chemistry

THIS, too, is only a small part of the Institute's activities. Research studies of all kinds are being conducted within its purlieus—1615 "short-term" studies were completed in the year, and 30 new "long-term" projects, excluding war research, were undertaken during the period. Perhaps most creative of envy is the news that the facilities are actually still extending. Of the Metals Research Building, two bays only are in use: five more are nearing completion. The Chemical Engineering Section has enlarged its analytical facilities to provide for unusual types of analysis. "This laboratory," we are calmly told, "has moved into larger quarters." Research workers, whether industrial or not, who have worked for years in cramped laboratories, will admire the casualness of the statement. There is a great deal of hopeful talk in the air at the moment

of the housing of all chemical activities under one roof somewhere in Britain. Perusal of the account of this great American research institute's activities shows at all events that the idea is far from being utopian. Even the much smaller Maison de Chimie, founded in Paris a few years before the war (what has become of it now?), was a pointer in the right direction. We are always slow starters over here; if we go wrong now, we cannot make excuses on the ground of lack of examples.

Synthetic Rubber

IN his paper last week on "Rubber, Natural versus Synthetic," Dr. S. S. Pickles said that, in view of the present shortage, it might be desirable that the situation regarding the manufacture of synthetic rubber in this country should be thoroughly investigated, and if found practicable, arrangements might be made to augment our rubber supplies from this source. He added that should such a course be decided upon it was fairly obvious that heavy initial outlay would be entailed and the labour problem would require solution. Presumably, therefore, it would be a project which could only be undertaken with Government support. Recently, Sir A. Duncan stated in the House of Commons that every step was being taken to extend the use of rubber substitutes which had been technically approved. It is now possible that the urgent need for rubber for the war effort will result in further progress towards the solution of this problem on the lines suggested in the near future.

Magnesium Development

MAGNESIUM, the lightest of all the industrial metals, is comparatively a newcomer to metallurgy, a fact that was made clear by Dr. C. H. Desch, F.R.S., head of the Metallurgical Department, National Physical Laboratory, in his paper on this material before the Royal Society of Arts in London last week. The chairman, Dr. D. R. Pye, C.B., F.R.S., Provost of University College, London, also referred to the remarkable developments involving magnesium in recent years. Starting from the stage of a material associated with indoor fireworks in the nursery it has so

far progressed that it is now not only a major factor but a critical factor in the world war, as he described it. One can only agree with Dr. Pye, who also added that magnesium had come into demand during the war from two sides: on the constructed side for the building of aircraft; on the destructive side for the business of incendiary desolation. We look forward to seeing what advantages engineering will derive from magnesium alloys in the post-war world. In our childhood we looked with wonderment on indoor fireworks made from magnesium; in war we marvelled at the importance of this metal in aircraft and land transport construction; what the future has in store no one can tell. It may yet be used in some form in rebuilding what incendiary bombs have destroyed.

Welfare Progress

LAST October the managing director of Newton Chambers and Co., Mr. H. E. G. West, announced to the South Yorkshire Section of the Institute of Chemistry that his company had offered, for a period of five years, a sum of £100 per annum to provide prizes for papers on work of outstanding merit on the subject of "Chemistry in Industrial Welfare," to be used at the sole discretion of the Section Committee. At the same time he expressed the hope that other firms might find ways of encouraging interest in chemical research, and that the Institute might give a lead so that the suggestion could develop in other parts of the country. There is no doubt that this public-spirited gesture is in the vein of the times; welfare in industry is, or should be, a subject of perennial interest, and it is to be hoped that the intensive propaganda directed, for war-work purposes, to attaining and securing safety will have a permanent effect. There are, indeed, signs that it is already having that effect. Not only has there been a symposium of the highest importance, in which the interlocking of the doctor's and the chemist's work in factory welfare was emphasised, but also many progressive firms have placed their safety affairs on a well-organised basis. In the January *Bulletin* of the R.S.P.A., for example, there is a description of how a Chelmsford manufacturing firm reorganised its safety committees, on the

lines recommended in our last issue. These several straws show how the wind is blowing.

Chemists' Insurance Scheme

THE Insurance scheme embodied in the Beveridge Report has many things in common with the scheme in operation in the chemical profession; in fact certain of the recommendations contained in the Report are included in the latter's scheme. It can be inferred that when the Beveridge Committee was first formed in 1936, details of the scheme of the British Association of Chemists proved extremely useful. When the Committee had under consideration the raising of the Unemployment Insurance limit to £250 per annum, the Association's delegates supplied details of their scheme, but they recommended no upper salary limit to Unemployment Insurance. Before the debate in the House of Commons last week, the Association sent letters to all M.P.'s, giving particulars of the Unemployment Insurance Scheme in operation in the profession, which has been built up by chemists, analytical and industrial, without any outside aid. The letter pointed out that the Association's scheme embraced some 2000 members; that the contribution did not depend on the salary of the individual, and there was no means test or differentiation between the sexes.

Wholesale Prices in January

THE chief rise during January was in the wholesale price of coal, which now has a Board of Trade Index Figure of 185.8 (1930=100), against 170.9 in December, 1942, an increase of 3.1 per cent. Iron and steel, at 182.7, and non-ferrous metals, at 126.0, have remained unchanged for a period of eight months. The price of chemicals and oils continues to rise steadily, the January figure being 142.7, which is a 0.5 per cent. rise on the December figure of 142.1, and a rise of 0.5 on the figure for January last year, which was 130.4. The overall rise in prices of industrial materials and manufactures during the month under review was 0.4 per cent. The greatest percentage rise in the chemicals and oils group was recorded for Pool burning oil (8.5 per cent), no other price movement in this group amounting to as much as 1 per cent. during the month.

Magnesium

War Developments : Future of Alloys

THE Peter Le Neve Foster lecture of the Royal Society of Arts was given by Dr. C. H. Desch, D.Sc., Ph.D., F.R.S., on February 17, his subject being "Magnesium." Magnesium, he said, the lightest of all the industrial metals, is a newcomer to metallurgy. It is by no means a rare metal; in fact, in abundance in the earth's crust it ranks sixth in the list of elements, and among the metals is surpassed only by iron, aluminium and calcium. Its late arrival is due to its chemical properties. Magnesium is a chemically active metal, which unites so readily with other elements that a great expenditure of energy is needed to set it free. Also, on account of its relatively low boiling point, processes which depend on the reduction of its oxide yield the metal in the form of vapour and the plant for carrying out the necessary operations on a large scale was not available until modern vacuum technique had been developed, and the electrolytic method starting from the chloride was adopted. Only a highly industrialised country, with cheap power, is in a position to establish a magnesium industry.

Extensive Applications

The fact that magnesium forms extremely light alloys, comparable in strength with others that are much heavier, gives it great importance in the construction of aircraft and of land transport such as omnibus bodies, and it is not surprising that war conditions have led to a very extensive development of its manufacture. The industry must not, however, be regarded as a war-time resource alone, but as one which will play a significant part in metallurgy and engineering when peace returns. Magnesia has important uses besides being the source of metallic magnesium. It is one of the essential refractory materials in the metallurgical industries, and magnesium oxychloride cements also consume considerable quantities. The purer varieties find application in the manufacture of magnesium salts, which are used in many industries. The greater part of the production is by calcining magnesite, which is carried out in either shaft or rotary kilns. When the calcination is carried out at about 850°C. the product, which still retains a little carbon dioxide, is porous and reactive, and readily absorbs moisture. Calcined at 1500°C. or higher, it is converted to crystalline periclase, and is described as dead-burned. It is then much less reactive. The temperature at which dead-burning sets in is lowered by the presence of iron, the most usual impurity.

The preparation of magnesia from sea water is not new, although it is only recently

that it has become industrially important. Oceanic waters contain on an average about 0.14 per cent. of magnesium, corresponding to a theoretical yield of 0.34 per cent. of the hydroxide. The process is an example of a very simple chemical reaction, involving much ingenuity in the planning of its industrial operation. As the supply may be regarded as inexhaustible, a cubic mile of sea water containing over four million tons of magnesium, industrial countries having sources of power near the sea coast have the opportunity of establishing a magnesium industry, and this is a factor to be taken into account in assessing the prospect of international trade after the war, in view of the probable importance of magnesium as a structural material, and of magnesite as a refractory for metallurgical purposes. The sea-water process involves the treatment of very large volumes on account of the low concentration of the magnesium salts, but it is simple in principle. In considering a site for a plant for this operation the neighbourhood of an estuary or river mouth must be avoided, so that the water taken in has the composition of oceanic water without dilution by fresh water. The exhausted solution after extraction of the magnesia must be discharged at such a distance that it does not reach the intake.

Alloys

After describing various processes, illustrated by lantern slides, Dr. Desch remarked that by far the greater part of the magnesium produced was used in the form of alloys. The original use of the metal in the form of ribbon as an illuminant is virtually obsolete, and only a small quantity finds application as a deoxidising agent for some of the non-ferrous metals. It has been proposed as a deoxidiser for steel, but its low boiling point rules it out for this purpose. The two important groups of magnesium alloys are those in which the magnesium forms the principal element, other metals being added to give the necessary mechanical properties, and the alloys consisting chiefly of aluminium, magnesium being present to the extent of five per cent. or more. These alloys are characterised by great resistance to corrosion, especially in sea water. The "ultra-light" alloys of the first class are now taking place among structural materials on their merits, not only in aircraft, where lightness is so essential, but even in many stationary machines. The principal object of alloying with other metals is to give increased mechanical strength so that the metal may be used for engineering purposes. Aluminium and zinc are the metals

most commonly added, with smaller quantities of manganese, but cerium and calcium are also used, and cadmium may take the place of zinc in exceptional cases. Copper and nickel are objectionable, but cobalt has been incorporated in alloys for use at high temperatures.

Magnesium alloys when properly treated give good and clean castings, which are little subject to blowholes, though a special form of micro-porosity is often present, which lowers the strength and becomes obvious when the casting has to retain a liquid, especially under pressure. For some special purposes this has been overcome by the injection under pressure of an organic plastic capable of hardening. The magnesium alloys lend themselves well to die-castings. Gravity die-casting is used for a great variety of products, but perhaps the most striking objects are those made by pressure die-casting. Sand castings of large size are also made successfully. In forging magnesium alloys the original ingot structure must be thoroughly broken down. The power required for the making of large forgings is very great, and large hydraulic presses are required. Rolling is performed on cast slabs, but more often on material which has already had its coarse structure broken down by extrusion. The machining qualities of magnesium alloy are excellent.

Absence of Fire Risk

Until air-raid literature made the name of the metal familiar, it was probably only known to the general public in the form of ribbon and powder for flash-light photography, being ignited by a match and burning with a blindingly white flame. It may therefore come as a surprise to learn that when used for constructional purposes it is virtually free from the hazard of fire.

Concluding, Dr. Desch said, "while aircraft and vehicle struction furnish the chief engineering outlet for magnesium alloys, they also find application in many instances in which lightness is an advantage, as in portable machine-tools, core boxes, gravity conveyors, large ventilating fans, and heads for high speed machine tools. The alloys will retain their usefulness after the war, and new applications will be found for the greatly increased production. The rise of the new material, the mineral resources of which are so abundant, provides an interesting example of the profound economic changes which may be brought about by technological development. New industries tend to grow in the neighbourhood of plants producing a metal, and in the planning schemes, of which so much is heard to-day, due attention will have to be given to the light metal industries, dependent as they are to a great extent on the availability of cheap electric power, and supplying material for many industries."

Bentonite as Plasticiser

For Moulding Sands and Bonding

BENTONITES are clays of the montmorillonite type, which, among other singular properties, exhibit unusually high plasticity, derived largely from the colloidal size of the particles. This property has been recognised for some time, and the use of bentonites as plasticisers with other less plastic clays has been patented under what are known in the ceramic industries as the Krause patents. Only small percentages of bentonite are needed to obtain the requisite plasticity, as compared with much larger quantities of the plastic clays commonly used. As the Krause patents are about to expire, the unrestricted use of bentonite as a plasticiser should appreciably increase the demand in the near future.

The practice of adding plastic clays to highly refractory clays usually has the effect of considerably lowering the refractoriness of the product. With bentonite as the plastic agent, the desired plasticity and green strength can be obtained with a minimum loss of refractoriness. In the whiteware industry also, investigations have shown that small additions of bentonite can take the place of much larger additions of ball clay; further china clay may be added to improve the colour. It has been observed recently by chemists of the U.S. Bureau of Mines that some bentonites, particularly those found in Mississippi, have high green strength when moulded wet, but lose much of this when they become dry. Other bentonites show the same green strength wet or dry, and some exhibit greater strength after drying. The loss of strength shown by the Mississippi bentonites adapts them particularly to the preparation of moulding sands for casting metals. For this use the high green strength of the bentonite is needed to preserve the form until the casting solidifies. After solidification the low strength is an aid in removing the sand from the castings.

Furnace Roof Repairs

Discussing the use of this material in connection with the repair of copper furnace roofs, Dr. Paul M. Tyler, of the Bureau, says that several of the copper smelters in the S.W. United States have been using silica slurry for patching reverberatory furnace roofs. By keeping the whole arch coated with silica the life of a roof is obviously extended greatly. With fireclay as bonding agent, half to two-thirds of the slurry fails to fuse and drops down into the bath, slowing the furnace as well as wasting material. By using about 3 per cent. bentonite as a bonding agent, nearly all the slurry adheres to this roof.—*Ceramic Age*, Nov., 1942.

Copper Compounds and Cellulose*

Some Practical Considerations

by R. F. YORK

SO much individual work has been done in connection with the relations between copper compounds and cellulosic materials, that it would be of interest to gather some of this information under one heading, in order to review the compounds of this metal in the light of their harmful or beneficial action on cellulosic materials. The relation between these compounds and cellulose is closely connected with the relation between the dyes applicable to cellulose and these compounds.

Cotton linters, after being thoroughly cleansed, bleached, and allowed to remain in contact with cuprammonium solution, form a viscous solution, the viscosity depending on the length of time the solution is allowed to stand and "ripen," together with the amount of chemical degradation. It is in this way that cuprammonium silk, subject to various patents as to exact procedure adopted, is manufactured. As most rayons are a form of regenerated cellulose, and therefore have the same chemical reactions as cotton, usually only the rapidity of the reactions differing, all future reference to cotton or cellulose applies to these materials as well, unless stated. It may be of interest here to point out that acetate rayon, being an acetate of cellulose, is an exception, as are the chemically synthetic fibres "Nylon" and "Lanital."

Determining Degradation

The fact that cellulose is soluble in cuprammonium solution is made use of in the determination of the amount of chemical degradation which cellulose has sustained. The fluidity of the solution formed, by dissolving a definite weight of the cellulose in the solution, is directly proportional to the amount of damage sustained. The technique has been explained¹ as follows: The cuprammonium solution is made up having not more than 0.5 gm. per litre of nitrous acid, a density of 0.94 and fluidity of 72 at 20°C. The viscometer for recording the viscosity (fluidity) consists, in principle, of a long tube of defined diameter having a capillary opening at one end of defined internal diameter. The tube has graduated marks tested by means of a solution of known viscosity. The fluidity is recorded by taking the time of flow between two points at 20°C.; the rate of flow varies inversely as its fluidity and density. The degradation of cotton can also be determined by examination of the fluidity of the

solution after being dissolved in cupric ethylene diamine.

The amount of damage caused by the presence of oxycellulose is determined by the use of Fehling's solution, made up as follows²: 34.6 gm. of pure crystalline copper sulphate dissolved in distilled water and diluted to 500 mls. Dissolve in separate vessels 173 gm. of Rochelle salt and 65 gm. of sodium hydroxide, mix these two and dilute to 500 mls. The two solutions are kept separate, and equal volumes mixed as required to form Fehling's solution. This reaction is used to test qualitatively if any oxycellulose is present in any suspected cotton by boiling for about 10 minutes gently in the Fehling's solution, when if any oxycellulose is present a red deposit of cuprous oxide is formed. This solution may also be used to estimate quantitatively the degree of oxidation the cotton has undergone, this determination being known as the "copper number." The "copper number" denotes the weight of copper reduced by 100 pts. of dry cotton. Pure or well-bleached cotton gives a number not exceeding 0.5, while Knecht's oxycellulose is given as 14.0, thus the intermediate values denote degree of oxidation that has taken place.

Oxygen Carriers

Copper compounds have frequently been used in the application of dyestuffs to cotton. Copper sulphide and sulphate under certain conditions act as catalysts, being known as "oxygen carriers" i.e., able to conduct oxygen from one body to another without themselves becoming changed. This factor is made use of in the application of aniline black to cotton, the colour being oxidised on the fabric by means of an oxidising agent along with the aniline, the copper salt transferring the oxygen from the oxidising agent to the aniline, forming aniline black. Certain dyestuffs of the substantive series when applied to cellulose are frequently made faster to light by after-treating with a 2 per cent. solution of copper sulphate.

This rendering of cellulose faster to light and an increase in the tensile strength by treating with copper compounds, is the subject of various patents. According to H. Dreyfus³, when titanium dioxide is used for delustring cellulose, the ensuing colorations on the work are not so fast to light as material free of this compound, especially in the wet state, also the material upon exposure to light decreases in tensile strength. He found that if the material is treated, either before or simultaneously with the incor-

* Silk and Rayon, 1943, 17, 2, 100.

poration of titanium dioxide, with a copper compound of insufficient strength to impart any appreciable coloration to the material, these defects are minimised. The compounds suggested are copper sulphate, chloride, or acetate. These compounds may also be applied for the same purpose to cellulose acetate. Deeper and purer shades of increased fastness to light, alkali, and washing are obtained by metallising diazo dyes on cellulose¹. This is accomplished by treating cellulose either during dyeing or after-treating by an agent yielding metal and containing it in combination with an aliphatic amino or a hydroxy-carboxylic acid. Various metal-yielding agents may be employed, those of interest to this paper being copper tartrate and copper diethanolamine which are examples of a hydroxy-carboxylic combination, tartaric acid having, in addition to two hydroxy radicals, two carboxylic: $\text{CO}_2\text{H} \cdot \text{CH}(\text{OH}) \cdot \text{CH}(\text{OH}) \cdot \text{CO}_2\text{H}$, and ethanolic acid having one of each, $\text{OH} \cdot \text{CH}_2 \cdot \text{CO}_2\text{H}$. Another agent is copper glycoollate which is an example of an aliphatic amino combination, the complexes being derived from amino acetic acid $\text{NH}_2 \cdot \text{CH}_2 \cdot \text{CO}_2\text{H}$.

Improved Colour and Handle

In carrying out preliminary experiments with copper compounds the following results were obtained: cotton was allowed to steep for 20 minutes in a solution of tetramine cupric hydroxide ($\text{Cu} \cdot 4\text{NH}_3(\text{OH})_2$) at 20°C. The solution was made by dissolving the light blue precipitate of cupric hydroxide in an excess of ammonia. The cotton was cleared of the blue coloration by steeping in dilute sulphuric acid, because if any of the blue coloration is allowed to remain on the cotton it will, when boiled, develop into a complex cupric oxide. After this treatment the cotton was well rinsed to remove traces of any free acid, then dyed with the normal range of substantive dyes along with a piece of untreated cotton, the treated cotton developing a much brighter and deeper shade when the dyeing was completed. On testing, the tensile strengths of the treated and untreated cotton were found to be for practical purposes the same.

The ability of copper compounds to improve the handle and tensile strength has been put forward by Ridgway and collaborators². They found that cellulose after the following treatment has the above improvements. The cellulose is passed through a solution of copper sulphate and then hydro-extracted, or the excess moisture removed by other means, until the weight of the material is double its original. It is then treated with ammonia and sodium hydroxide, passed into a receptacle containing sulphuric acid at the rate of 60 gm. per litre. In addition to gaining improved handle and tensile strength, it is claimed

that the material will resist wrinkling and shrinkage and also mildew. The resistance to mildew is notable, because when mildew is formed it gives off hydrogen sulphide which upon coming into contact with metal or metal compounds forms coloured spots; in the case of copper and its compounds black or bluish-black spots will appear. Elkin and White³, state, in an article on the rotproofing of jute, that cuprammonium solution forms a copper complex with ligno-cellulose as with pure cellulose. They treated jute, flax, and cotton with metallic soaps, the one of interest being copper oleate having a copper content of 0.8 per cent. for flax and jute, and 1.1 per cent. for cotton. The relative percentage loss in strength after being buried in the ground for three weeks at 29.5°C. is given as 4 per cent., 17 per cent., and 6 per cent., respectively. Copper naphthenate was found to protect jute from the action of the sun as well as the oleate. The figures, after exposure to strong sunlight for one month, are as follows: copper oleate (0.6 per cent. Cu) loss in strength 22 per cent., copper naphthenate (1.3 per cent. Cu) loss of 16 per cent., and (0.8 per cent. Cu) loss of 12 per cent. The resistance to mildew is also due to the catalytic action of the copper compound causing the material to be always in a slightly acidified condition, thus preventing the mildew from forming.

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- 2 TROTMAN, *The Bleaching, Dyeing and Chemical Tech. of Textile Fibres*. (Griffin, 1925, p. 127).
- 3 B.P., 475, 356.
- 4 B.P., 331, 470.
- 5 B.P., 312, 470.
- 6 ELKIN and WHITE, *Dyer*, 82, 7.

LOW-TIN SOLDERS

The tin conservation orders of the United States War Production Board specify substantial reductions in the tin content of solders used in repairing and re-assembling gas meters. In order to meet these requirements, the Consolidated Edison Company of New York has undertaken investigations to find a formula for low-tin-content solder. The most satisfactory results were obtained from a solder composed of 30 per cent. tin, 2 per cent. antimony, and 68 per cent. lead. Accelerated life tests under vibration, heating and cooling cycles above normal pressures, etc., were applied to meters assembled with solders made to this formula, as well as the conventional 50/50 tin-lead solder. Some adjustment of long-established practices was necessary with the new solder, but when these had been made, very satisfactory results were obtained.—*Gas Age* (90, 8).

Chemical and Allied Industry in Spain

More Pyrites Processed : New Plant Installed

ON the occasion of the recent opening of one of the Sample Fairs in Spain, the Under-Secretary for Industry, Señor Granell, reviewed the various laws and decrees of the past two or three years by which the Spanish Government had attempted to stabilise and develop certain branches of industry considered vital in the national economy. Under this legislation, national syndicates were established; certain industries were assisted and developed; and a National Institute of Industry was established, which, according to Señor Granell, completed the Government's programme and provided a guarantee that Spanish industry should be placed on a sound and permanent basis. In the first few months of its existence the National Institute of Industry has assisted financially or otherwise in the establishment of several national *Empresas* or corporations including the "Adaro" for mineral research; the "Calvo Sotelo" for liquid fuels and lubricants by the distillation of lignites and bituminous shales.

It is estimated that the Director General of Industry has authorised some 12,000 new installations with a total capital investment of 850,000,000 pes. The leading industrial area of Vizcaya alone has some 2000 new plants, and also claims four of the eleven *empresas*. The total sum allocated for developments of nationally vital importance during the past three years is no less than 1600 mill. pes, and it has been achieved in a period described by the Caudillo (General Franco) as the most difficult in the economic life of Spain.

Artificial Fibres and Cellulose

Owing to the interruption in world trade, artificial fibres are more than ever essential to countries in Europe cut off from supplies of natural fibres and wool from overseas, and this was realised by the Spanish Government in its decree of March 15, 1940, whereby the great textile *empresa* was organised. Artificial silk alone was, of course, quite inadequate, and thus occurred the immense development in the direction of cellulose wool, which has an almost unlimited field of usefulness. An interesting recent development is the use of synthetic fibres in the manufacture of tapestries and carpets, and probably for the first time in Spain carpets made from artificial fibres were shown at the recent Sample Fair in Barcelona. Textile factories for the manufacture of synthetic fibres, mainly from straw, have been established in Germany and in view of the large available supplies of rice and wheat straw, etc., it is possible that a similar in-

dustry on a large scale may be established in Spain.

Mineral Self-Sufficiency

Self-sufficiency in minerals was the subject of a broadcast from the "Voice of Spain" by the Editor of *Mineria y Metalurgia*, Dr. A. H. Egaño (*Ion*, October, 1942), who said the exigencies of the civil war and the present war had made it imperative to organise Spanish industry generally on a sound basis, and particularly that section relating to mineral extraction. In addition to the National Institute of Industry, there have been organised special bodies to look after the metallurgical and allied industries, and on the question of fuel supplies, numerous attempts to discover petroleum have largely failed, but there is hope that some of the borings of recent date might yield results. Spain has large supplies of distillable lignite, e.g., at Iruel and Berga, and bituminous shales, such as those of Ciudad Real, which should yield large supplies of liquid fuel. Also the output of coal and anthracite is continuing its upward curve, and by 1945 Spain should be self-supporting. In regard to metals generally, the country is generously endowed, especially in iron, gold, silver, mercury, copper, lead, zinc, antimony, aluminium, and magnesium; also potassium and phosphatic salts.

It is also reported that Spain is processing more pyrites into sulphuric acid, partly because the transportation difficulties handicap pyrites exports. Processing of pyrites at home should permit recovery of small amounts of by-product arsenic and copper, badly needed for insecticides. Spanish copper requirements amount to around 30,000 tons a year. Domestic production since the civil war has averaged only 5000 tons a year.

Nitrogen

Spain in the past has had to import up to 90 per cent. of its fertiliser requirements. Since these are now largely unobtainable, I. G. Farben is reported to be installing, on behalf of Spanish steel interests, an ammonium sulphate plant. If completed this year as scheduled, it should be able to supply 30 per cent. of Spain's nitrogen requirements. The effect of the present shortage of fertilisers in Spain is seen in reports that last year's orange crop was below normal, and the rice crop reached only 700,000 tons.

An interesting contribution regarding the nitrogen problem has been made by Señor Gonzalez de Haro, Chief of the Technical Service of Potasas Españolas S.A. (*Ion*, September, 1942) who estimates the total

annual requirements of Spanish crops in nitrogen at 545,000 metric tons, from which he deducts 185,000 tons on account of leguminous crops which get their own supplies from the air.

It is known that small amounts of Chilean nitrate have been coming into Spain up till, fairly recently, but these have not appreciably reduced the deficit, and despite the very ambitious programme of new synthetic nitrogen works in Spain it would seem that actual output is still comparatively small. The position is, however, somewhat ameliorated by the practice which is common in Spanish farming, of growing leguminous crops to absorb nitrogen from the air and then ploughing them in.

The Nation's Fuel

Post-War Problems Involved

IN a review of its work, the Fuel Efficiency Committee says:—"As a nation, we cannot afford to revert to the fuel waste of the improvident years before the war," and this sums up the opinion generally expressed throughout the country. The committee was first set up in September, 1941, but when the Ministry of Fuel was established, it was reconstituted and became representative of all fuels, a desideratum which had been maintained in the composition of regional committees. A fully co-ordinated campaign had been undertaken, ensuring that economies in the use of one particular fuel did not merely mean an increase in the use of alternatives. Approaches were made to industry from several directions and it had taken time to develop fully the elements of the campaign. In recent months, however, there had been a rapid extension of the system of inspection of individual factories by qualified combustion engineers, and up to the middle of December last nearly 2000 factories, with an aggregate coal consumption of 8,000,000 tons a year, had been visited; the recommendations, if carried out, should result in a saving of about 10 per cent. of the annual consumption. The Regional Committees had not confined their attention to securing economy in coal alone, but the assistance of experts in the use of gas, electricity, and fuel oil had been enlisted with considerable effect.

Another important aspect of the campaign had been the issuing of bulletins (see *THE CHEMICAL AGE*, January 30) by the Technical Sub-committee dealing with problems affecting the production of steam, while in the near future the heat utilisation aspect would receive attention. A fuel efficiency training scheme had also been established and it was hoped this would have a far-reaching effect on future training in fuel technology. Industrial groups were appointing full-time Fuel Efficiency Officers, a

development that the Ministry was anxious to encourage.

In its conclusions the Committee says:—"The campaign has been directed largely to alleviating present fuel supply difficulties, but much has been done which will have a long-term beneficial effect on industrial practice and should be of immense value in the post-war years. Also, the probability of high fuel prices will mean that efficient utilisation will be of prime importance to industry if manufacturing costs are to be kept within reasonable limits. The activities of the committee, in the words of one industrial association, 'has had the effect of making the whole trade fuel-conscious, and this in itself has greatly improved the economic use of coal.' It is hoped that this momentum will not slacken or lose way when peace returns."

New British Standards

Lead Alloy Pipes

SPECIFICATION (B.S. 1085) concerning lead alloy pipes has been made at the joint request of the Ministry of Works and Planning and the Non-Ferrous Metals Control, Ministry of Supply, to ensure maximum economy in the use of lead. The use of lead pipe has been severely restricted, and the new specification will make the use of lighter weight pipe possible for most waterworks purposes. The composition of the metal differs from that required under B.S. 662. It has been found that small percentages of alloying materials (copper and silver) increase the resistance of pipes to creep due to steadily maintained internal pressure, as the alloy can withstand higher stresses than commercial lead. Copies of this specification may be obtained from the B.S.I. price 1s. post free.

Tars for Road Purposes

A B.S.I. revised War Emergency Specification for tars for road purposes (B.S. 76-1943), which supersedes B.S. 76, Parts 1 and 2, has been prepared by the British Road Tar Association. Three types of tar, differing mainly in setting properties, are specified, and each is subdivided according to viscosity, as controlled by the oil content. The ring and ball test on the distillation residue is included, because it is considered that this will assist in excluding unsuitable tars. The tars are described by the Equi-Viscous Temperature, which is that temperature at which a tar has a time of flow of 50 seconds by the standard tar viscometer. Thus the E.V.T. is the temperature to which tar must be heated to bring it to a standard viscosity, and no ambiguity is possible if tar is specified by its E.V.T. Copies of B.S. 76-1943 are obtainable from the B.S.I. price 2s. 3d. post free.

Synthetic Adhesives in Use*

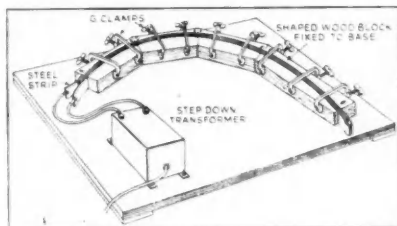
Speedy Construction of Laminated Work

THE setting-time of synthetic resin adhesives, as is well known, is greatly reduced by a rise in temperature. Thus Aerolite K with Cold Hardener Red will set in 1½ hours at 21°C., but only needs a few minutes at 90°C. It has been found not at all difficult to heat many of the ordinary jigs used in production wood working by simplified electric heating in which the heating element consists of a simple steel strip carrying a low-tension high-amperage current.

The accompanying figure shows, for instance, how easily a conventional jig for making laminated bends can be heated by the use of such a thin steel strip held against the outer faces of the laminated bend. The two free ends of this strip are connected to a step-down transformer having an output of about a kilowatt at a low voltage; on passing a current through the steel strip it is quickly brought to any desired temperature. Owing to the low voltage employed there is no danger to the operator from electric shock. Using a "Superspeed" transformer, the optimum resistance of the steel is between .0625 and .0588 ohm, but for intermittent operation the transformer can be safely pushed to a higher output by the use of a steel strip of .05 ohm resistance. At this value of resistance the transformer rating is one

hour's operation provided free air-cooling is available.

The specific resistance of steel is 20×10^{-6} in ohm/cm. units. If l is the length of the



strip, t the thickness, and b the breadth of the strip (all in inches) then to get the load matched to the transformer:

$$.05 = \frac{20 \times 10^{-6} \times l}{2.54 \times b \times t}$$

$$\text{or } t = .0001574 \, l/b.$$

Suppose we need to use a strip 72 inches long and 1 inch wide, then the required thickness will be: $t = .0001574 \times 72/1 = .0113$ inch. We should thus choose a strip of 30 s.w.g. (.0124 in.). Regulation of the temperature is best affected by a variable resistance on the input side, but the temperature can, of course, also be reduced by increasing the lengths of the free ends of the steel strip.

* From *Aero Research Technical Notes*, No. 1, by permission of Aero Research, Ltd., manufacturers of synthetic adhesives.

Colour Control in Paint

Suitable Instruments must be Provided

THE effects, so far as they were discoverable, of recent colour research in the paint industry, were dealt with by Mr. E. R. Wells, B.Sc., A.R.C.S., of Cellon, Ltd., when he presented a paper on "Colour Control in the Paint Works" to the London Section of the Oil and Colour Chemists' Association on February 20. Mr. Wells said that during the past 20 years a great deal of work had been done on the problem of colour in all its aspects, but much remained to be done before full benefits could be derived from the fundamental work, which only the physicist by virtue of his training and equipment was able to carry out. It was necessary to master a very considerable terminology of colour if any real understanding of colour problems was to be attained, and there was a necessity for speed and simplicity of operation when the design of colorimeters was being considered.

After reviewing the situation concerning

instruments available for testing purposes, Mr. Wells mentioned some of their defects, and then went on to deal with raw materials, saying it was clear that the paint manufacturer was primarily in the hands of the pigment manufacturer, and if both pigment and paint were manufactured at the same time, so much the better. However, this was not the case.

Concluding, he said that while it is possible to carry on the paint manufacture with operatives whose colour vision is an unknown quantity and without recourse to colorimeters, such methods are productive of inefficiency and waste. Efficient colour control could only come about by placing the ultimate authority in a single department; by a careful testing of colour vision characteristics of all matching and testing personnel; and by the provision of suitable instruments for the maintenance of colour standards. These necessitated a better knowledge of colour-blindness and of the proper methods of testing for it; also, the provision of colorimeters and glossmeters.

Cassava Starch

Development of an Empire Product

UNTIL the Japanese entry into the war, 95 per cent. of the world's commercial cassava starch—or tapioca flour, as it is usually called in commerce—came from the Netherlands East Indies. In 1940, however, first the restriction of shipping and later the cessation of supplies rendered the position acute as regards this commodity, which is of importance to the war effort, being required for the manufacture of dextrine and adhesives. At this point the activities of the Imperial Institute came into play, and since the close of 1940 its chemists have been collaborating with the Nigerian Department of Agriculture in arranging for a supply of cassava starch from Nigeria. Dr. J. R. Furlong, Ph.D., A.I.C., of the Institute's Plant and Animal Products Department has described the steps taken (*Bull. Imp. Inst.*, 1942, 40, p. 257), and a very brief summary of these is appended here.

The Preparation Process

The plant that yields cassava starch is *Manihot utilisima*, which is widely grown in Nigeria, its roots being ground to provide a local foodstuff as well as a crude starch. The Nigerian agricultural authorities have developed a method of preparing starch of commercial quality and, with their usual skill, have departed very little from the customary method developed by the natives themselves. A very interesting account of the process, by Mr. K. T. Hartley, Senior Agricultural Chemist in Nigeria, is added as an appendix to Dr. Furlong's article. The outcome of the collaboration mentioned above has been that Nigeria can now supply British factories with high-quality commercial starch. For the present, facilities for fine-grinding the starch are not available in Nigeria, and this must be carried out by the purchasers or their agents in the U.K.

A report on six batches of Nigerian starch, prepared by one African woman under departmental supervision, has been recorded. Chemical analysis carried out at the Imperial Institute by Mr. F. Major and Mr. H. E. Coomber revealed that two of the batches were clean and well-washed, and dextrinisation tests showed that these two were superior to all the others. Only one was found quite unusable, owing to faulty drying. All the samples were lumpy, but this is due, as has already been indicated, to the absence of grinding machinery on the spot. A further 15 samples prepared by the Agricultural Chemist also gave encouraging results. The Ministry of Food, in view of the urgency of starch requirements, has announced that it is prepared to waive the regulation calling for

smooth starch, provided that in other respects the starch comes up to the required standard. Large users, therefore, who are in a position to grind their own starch, and millers, etc., who can handle lumpy starch and prepare it for users who do not possess grinding equipment, may now proceed with the preparation. At the same time it is far more economical for the material to be finely ground at the source.

Institute of Chemistry

Nominations for Elections

IN addition to those officials and members of Council who are eligible for re-election, the following members have been nominated for election to the vacancies in the Institute of Chemistry caused by the retirements reported in our issue of January 16. *President*: Professor Alexander Findlay; *Vice-Presidents*: F. P. Dunn, J. J. Fox, I. M. Heilbron, D. Jordan-Lloyd, L. H. Lampitt, W. H. Roberts; *General Members of Council*: G. N. Burkhardt, G. Dring, F. R. Ennos, T. H. Gant, T. R. Hodgson, T. McLachlan, A. J. Prince, F. Scholefield; *Ordinary Members of Council*: E. E. Ayling, G. R. Clemo, J. W. Corran, L. Eynon, R. D. Haworth, F. M. Lea, J. I. O. Masson, H. Moore; *District Members of Council*: Osman Jones, G. F. Hall, R. W. Ancrum, G. E. Dodds, N. M. Cullinane. In addition to the retirements already mentioned, the following District Members of Council are ineligible for re-election: A. C. Monkhouse, E. Gregory, N. L. Sheldon.

Support for the scheme to found a Federation of Chemical Bodies, and to house the activities of all such bodies in a single building, has been forthcoming from the Belfast and District Section of the Institute, who have also tabled the resolution that Northern Ireland should have its own District Member of Council.

NEGRETTI AND ZAMBRA, LTD., 122 Regent Street, W.1, have issued a publication (R.19) dealing with their flow-operated switch, which enables an electrically-operated audible or visual warning to be given immediately a change occurs in the rate of flow of fluid in a pipe. It is stressed that this device depends entirely on change in rate of flow, and should not be confused with pressure-operated alarms, which are often unreliable, as under certain circumstances the static pressure may remain although the flow has failed. The switch may be used for either liquids or gases, with slight variations in construction. The publication includes three simple nomograms, by means of which the size of a suitable orifice in relation to the pipe diameter can be ascertained.

Personal Notes

MR. A. E. GRIEVE has succeeded MR. JOHN LAWSON on the board of English Clays Lovering Pochin & Co., Ltd.

MR. E. G. SMITH, Porthcawl, Glam., for many years general manager of the Briton Ferry Chemical Company, last week celebrated his golden wedding. Mr. Smith is at present with the Ministry of Supply.

PROFESSOR F. C. LEA has been elected president of the Institution of Mechanical Engineers. He was professor of engineering at the University of Sheffield from 1924 to 1936.

PROFESSOR H. J. CHANNON, head of the Department of Biochemistry in the University of Liverpool, has resigned his appointment consequent on his acceptance of a research post with Messrs. Lever Bros. & Unilever, Ltd., from September 1.

MR. WALTER J. MURPHY, who has been editor and manager of *Chemical Industries* since 1939, has been chosen to succeed the late Harrison E. Howe as editor of *Industrial and Engineering Chemistry* and *Chemical and Engineering News*, on the recommendation of the executive committee of the American Chemical Society.

DR. PER K. FROLICH, the new president of the American Chemical Society, is, at 43, the youngest president to be elected for 30 years. Born and educated in Norway, Dr. Frolich accepted in 1922 an American-Scandinavian Foundation Fellowship at the Massachusetts Institute of Technology. Since 1929 he has been associated with the chemical activities of the Standard Oil Development Company.

MR. HARRY EDMUND NEWALL, assistant chief engineer of the National Board of Fire Underwriters, New York City, is to receive the James Turner Morehead Medal for leadership in developing standards for installation and operation of acetylene equipment and systems. The medal is awarded annually for outstanding work in the acetylene industry or for advancements in the production or use of calcium carbide or acetylene.

Obituary

DR. ERNEST GUGLIEMINETTI, the inventor of a road-tarring process, has died in Geneva, aged 88.

MR. JAMES BLAIR CROLL, late engineer to the Richmond Main Sewerage Board and honorary secretary of the Institute of Sewage Purification, died at Richmond, Surrey, on February 18.

New Protein Food

Jamaica's Large-Scale Experiment

EXPERIMENTS just completed by the D.S.I.R. have shown that *Torula utilis*, a kind of yeast, can be economically manufactured, as a food, from sugar or molasses. Its manufacture will also help with the surplus sugar problems in some British colonies. The yeast is rich in proteins and, in a dried form, in vitamins of the "B" group. These are almost invariably lacking in tropical diets which consist largely of starchy food items, and the yeast will also be invaluable for reinforcing the diets of occupied countries after the war. Jamaica has been chosen as the site for the first large-scale experiment. A preliminary grant of £25,000 has been made by the U.K. Exchequer, and a plant is to be sent out which should produce about 2000 tons a year. Two biochemists will supervise the manufacture of the product. A representative of THE CHEMICAL AGE attended a demonstration of this new "food yeast" at the Chemical Research Laboratory of the D.S.I.R. A thin and insipid green vegetable soup was transformed into a "meaty" and sustaining liquid dish by the addition of a small quantity of the "yeast."

New Control Orders

Abrasives, Insulators, Catalysts

Under the Export of Goods (Control) (No. 3) Order, 1943 (S. R. & O. 1943, No. 231, price 1d.) which comes into force on March 8, control is extended to cover Sheffield lime; Vienna lime; tripoli; grinding and polishing compositions; materials containing mica and articles made therefrom; catalysts containing nickel, nickel compounds or phosphorus compounds; mixtures consisting wholly or mainly of manganese dioxide and graphite; and ouabain. Under the Order, licences will in future be required to export the above classes of goods to all destinations.

BONUS SCHEME SURVEY

A survey of incentive bonus schemes for indirect workers has been prepared by Harold Whitehead and Staff, Ltd., of London, based upon a questionnaire circulated to several hundred industrial and other concerns in the United Kingdom, and it should form a concise and practical guide to managements confronted with requests for schemes in these days when increased output is so vital. A limited number of copies of the report are available to managing directors of firms on application to 31 Palace Street, S.W.1.

New Canadian Iron Deposit

America Working in Co-operation

THERE is good news concerning the development of Canadian mineral resources, and one of outstanding importance is the opening of extensive iron-ore deposits at Steep Rock in Western Ontario, about 200 miles from Port Arthur and linked with the Canadian National Railway system between Great Lakes Harbour and Winnipeg. Development of these deposits is due to the war, and so far the proved reserves are 32 million tons. The deposits form the bed of a lake which stretches for fifteen miles, with a depth of 150 ft., and the engineers plan to go 1500 ft. below the lake bottom.

Steep Rock Mines is the name of the company concerned, and the deposits are being worked in association with the Republic Steel Corporation (Little Steel), of the United States. Both Canadian and U.S. Governments are assisting in financing the new works, and Ontario is to co-operate with the Federal Government in completing a link with Canadian National Railways, and in providing dock and loading facilities at Port Arthur, and suitable power-transmission facilities.

Benefits Expected

The Dominion of Canada has always been a substantial importer of iron ore from the United States, and therefore great benefits are expected to accrue as a result of the dis-

covery; it is at the same time of importance to the United States because of the threatened exhaustion of the world-famed Mesabi Range deposits in Northern Michigan and Minnesota. The bulk of the iron ore used in the American steel industry has come from the Mesabi Range for many years, but expert opinion recently held that reserves of high-grade ore in this district would be exhausted by 1950, even if allowance were made for a reduction from the present tremendous pressure for materials to fill the steel industry's needs. The Mesabi deposits were formerly regarded as virtually inexhaustible. The Steep Rock deposits are now looked upon as an extension from the Mesabi Range, and they are likely to be significant in the pattern of North American economy, if present promise is fulfilled.

Unusual interest on the part of the United States may be expected in the future North-American iron-ore position, especially now that some experts have envisaged that they would in time be forced to turn to Brazil for high-grade ore, as the ore reserves there are known to be tremendous. So far as the Steep Rock developments are concerned it is stated that a U.S. Government agency is co-operating and that a bond issue has been made in the United States—facts which speak for themselves.

Natural and Synthetic Rubber

Future Closely Linked

"RUBBER: Natural *versus* Synthetic," was the subject of a paper read by Dr. S. S. Pickles, D.Sc., F.I.C., at a meeting of the Dominions and Colonies Section of the Royal Society of Arts, in London, on February 16. The speaker pointed out that the title was misleading as it emphasized the idea of antagonism between two classes of material. His intention was to compare their respective properties, note their similarities and differences, and consider how they met the requirements of users and manufacturers of rubber products.

Dr. Pickles explained that if they could obtain by synthetic means an organic material which possessed the property of elasticity, comparable in degree to that of rubber, they might to that extent claim to have produced a synthetic rubber. In comparing natural rubber with synthetic rubber there were two main angles from which the material might be considered: from the point of view of the user and from that of the manufacturer. Summarising the com-

parisons, he said that natural rubber would appear to have the advantages in (a) processing properties; (b) resilience, elastic recovery or low hysteresis loss; (c) tensile strength (in some cases). The synthetic rubbers, on the other hand, might claim superiority in (a) resistance to oils and organic solvents; (b) resistance to heat and oxidation; (c) lower permeability to liquids and gases.

It would seem that the logical procedure for British rubber manufacturers, in normal times, would be to use synthetic products to supplement, rather than replace, his natural rubber; but under the present conditions of rubber shortage, freedom of choice was limited, and one might say that at the moment, the problem was one of natural rubber *plus* synthetic rather than that of natural *versus* synthetic. The future of both industries, natural and synthetic, must inevitably be closely linked and, in the interests of both, their efforts should be directed towards that end.

General News

Membership of the Newcastle Chemical Industry Club remains about the same as last year, the few resignations being balanced by new elections. The 24th annual meeting was held on February 25.

Welding plays a bigger part in the construction of austerity engines which are made at a North-East factory where locomotives were inspected last week by the Minister of Production. All parts are interchangeable.

The Lord Provost of Edinburgh, in a letter to Sir Patrick Dollan, chairman of the Scottish Fuel Efficiency and Economy Committee, commends experiments which are being made with peat as a substitute for fuel and other utilities.

Dr. W. D. Jones, speaking at the North-East Coast Institution of Engineers and Shipbuilders, at Newcastle, said that greater use of the processes of powder metallurgy would release considerable skilled labour and prevent the wastage of much raw material.

Two new D.T.D. Specifications have been issued by the Ministry of Aircraft Production. They are: 335a, Synthetic Resin Cement (Non-Gap Filling) (superseding D.T.D. 335); and 915a, Process for Cleaning Aluminium and Aluminium Alloy Plating prior to Painting (superseding D.T.D. 915). The price of each is ls.

The latest publication of the Institute of Chemistry is entitled "Chemistry and the Petroleum Industry," and is based on the important lecture by Dr. A. E. Dunstan, delivered under that title, before the Institute in May, 1941. The new publication is copiously illustrated with photographs and diagrams.

New welfare buildings at Morris Motors, Ltd., opened this week, include a health centre in charge of a works medical officer. This medical section is equipped with the latest X-ray and other apparatus. A feature of the general welfare scheme is a new Food Research Department at Messrs. Barkers (Contractors), Ltd., who operate the Morris canteen.

Leeds University Council have accepted an offer, made by Mr. Henry Ellison, of Calverley, of £50,000 for an endowment fund for post-graduate research Fellowships in pure and applied physics and chemistry. Mr. Ellison, who was educated at the Yorkshire College (as Leeds University was entitled over 50 years ago), has been associated with Yorkshire Tar Distillers ever since the company was established some 16 years ago; he has also had a long connection with the Sheffield Chemical Company and the Mirvale Chemical Company.

From Week to Week

The rate of clearing-office commission at the Anglo-Turkish Clearing Office has been reduced from $\frac{3}{4}$ per cent. to $\frac{1}{2}$ per cent. on February 15.

Foreign News

East African rubber production may be doubled as the result of the successful adaptation of the Malayan tapping system.

The demand for scheelite in the manufacture of munitions has become so acute that mine dumps in Southern Rhodesia are being searched for this mineral, normally a waste product.

An Argentine Chamber of Mining, affiliated to the Argentine Chamber of Commerce, has been constituted in Buenos Aires to protect the mining interests and the metallurgical industry in Argentina.

The iron mines at Delémont, Switzerland, which were shut down seven years ago, have been re-opened by the Gesellschaft der L. von Roll'schen Eisenwerke A.G., and have been furnished with up-to-date equipment.

Waste sulphite liquor from chemical pulp mills in Quebec is being used as a binder for road surfaces, according to a report quoted by *Foreign Commerce Weekly*. This "stabilised gravel," as it is called, is replacing asphalt, which is subject to priority calls.

Mullite bricks from American cyanite are now a subject of active research. The aim of the technologists engaged is not to produce a brick that will imitate those made from Indian cyanite, but rather one with useful properties of its own.

Montecatini have increased their share capital from 1600 to 2000 million lire, in order to absorb the Società Ammonia e Derivati, the Società Generale per i Prodotti Azotati Sintetici, and the Società Elettrica Alto Adige.

Produits Chimiques de Tessenderloo, Belgium, who lost the greater part of their chemical plant on April 29 last year as the result of an explosion, have re-established three of the departments that were destroyed, those dealing with electrolysis, with the concentration of phosphates and with unblended phosphates.

Ceramic chemists in America are engaging in research with a view to producing pipe that will satisfactorily replace metal in the field of pressure piping. Urgently needed metal is at present utilised in the construction of oil pipe lines, and it is hoped to be able to replace this by ceramic products. It is felt that this is a line of research which may lead to constructive post-war results.

The period of temporary exemption from duty and the war-exchange tax on glue, powdered or sheet, when imported into Canada and subject to duty under the intermediate or preferential tariffs, has been extended to June 30, 1943.

Only 293,338 tons of linseed were exported from Argentina in the first nine months of 1942, exports to the United States amounting to 229,842 tons, according to the Argentine press. Total exports during the corresponding periods of 1939, 1940 and 1941 were 1,095,656 tons, 717,886 tons, and 506,129 tons.

In order to develop the oil deposits at the foot of the Carpathian Mountains, a new company—Karpatten Oel A.G.—has been formed at Lwow, Poland, with a capital of 30 million zloty. Practically all firms with important oil interests in Germany are participating in it. The company is authorised to search for, produce, refine and export oil, and to deal with natural gas and bituminous substances. Its activities are restricted to the "Government-General" of Poland.

Shortage of iron in Italy has awakened interest in the deposits of ferrous sands found on the Italian coast, especially near Rome. The sands contain about 5 per cent. of iron and can be conveniently briquetted. From 1800 lb. of briquettes 1000 lb. of iron can be produced in electric furnaces, using 560 lb. of lignite coke, 215 lb. of limestone, and 14 lb. of electrode material. Trial plants have been in operation at Terni and Aosta, and a production of 600 tons of concentrates daily is aimed at.

Two electrochemical syntheses of organic compounds that are being employed to-day in the U.S. on an industrial scale involve the use of sugar as depolariser. These are the electrochemical oxidation of glucose to produce gluconic acid, and the electrochemical reduction of glucose and other sugars; mannose, for example, being reduced to mannitol and sorbitol. The commercial production of mannitol and sorbitol provides products that are not only useful in themselves, but can also serve as the starting material of new organic compounds, e.g., in the preparation of esters, and also to replace glycerine for a number of purposes. A production plant has been set up by the Atlas Powder Company of Wilmington.

Forthcoming Events

As already announced, the annual general meeting of the **Institute of Chemistry** will take place at 30 Russell Square, London, W.C.2, on **March 1**.

A joint meeting of the London Section, **Society of Chemical Industry**, with the

Electrodepositors' Technical Society, will be held in the rooms of the Chemical Society, Burlington House, London, W.1, on **March 1**, at 2.30 p.m., when Dr. S. Wernick will lecture on "Anodic Polishing."

The Midlands Centre of the **Electrodepositors' Technical Society** will meet at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 5 p.m., on **March 2**, when a paper on "Protective Immersion Treatments" will be read by Mr. C. Harris.

"Calcium Metabolism in Health and Disease" will be the subject of a lecture to the **Royal Society of Arts**, John Adam Street, Adelphi, by Dr. J. D. Robertson, on **March 3**, at 1.45 p.m.

To commemorate the birth on March 3, 1843, of the distinguished metallurgist, Sir William Chandler Roberts-Austin, a lecture on his life and work will be given by Dr. S. W. Smith, on **March 3**, at 5.30 p.m., at the Institution of Mechanical Engineers, Storey's Gate, S.W.1. The lecture is being arranged jointly by the **Institution of Mechanical Engineers**, the **Iron and Steel Institute**, and the **Institute of Metals**. It will be preceded at 3 p.m. by the annual general meeting of the **Institute of Metals**, which will include the following three papers: "The Properties of Commercial Coppers Containing Selenium, Tellurium and Bismuth," by Mr. G. L. Bailey and Mr. A. P. C. Hallows; "The Effect of Selenium, Tellurium and Bismuth on Deoxidised Copper for Tube Manufacture," by Mr. M. Cook and Mr. G. Parker; and "A Note on the Damping Characteristics of Some Magnesium and Aluminium Alloys," by Mr. L. R. Stanton and Mr. F. C. Thompson.

The annual general meeting of the Glasgow and West of Scotland Section of the **Society of Chemical Industry** will be held in the Royal Technical College, Glasgow, on **March 5**. It will be followed at 7 p.m. by a lecture on "Shellac: Its Uses in Modern Industry and in War-Time," by Mr. A. J. Gibson, at which the local sections of the **Chemical Society** and the **Institute of Chemistry** will also be present.

There will be a meeting of the **Institution of the Rubber Industry** in the Caxton Hall, Westminster, at 6.30 p.m., on **March 8**, for a symposium on "Rubber-like Dispersions and Emulsions."

The **Chemical Society** (Leeds Area Section) will hold a joint meeting with the Leeds University Chemical Society, in the Chemistry Lecture Theatre, Leeds University, on **March 9**. A lecture by Professor H. W. Melville on "The Synthesis of High Polymers" will be presented at 6.30 p.m.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Bill of Sale

RENNY, Jno. Lionel Selit, flat 9, 23 Hertford Street, W.1, chemical engineer. (B.S. 27/2/43.) Dated November 30, filed February 12. Settlement for wife, etc.

Company News

Aspro, Ltd., announce an interim dividend 10 per cent. (same).

Lightalloys, Ltd., announce an interim dividend of 12½ per cent. (same).

The Kern Oil Co., Ltd., announce a net profit of £45,305 (£46,801). The dividend of 6 per cent. has already been announced.

Cornercroft, Ltd., mechanical and aeronautical engineers, announce the registration of a second wholly-owned subsidiary—Cornercroft (Plastics), Ltd.

Leeds Fireclay Co., Ltd., announce an interim dividend on the 6 per cent. non-cumulative participating preference shares, of 3 per cent. in respect of the year ending June 30, 1943.

W. D. Earnshaw (Welwyn), Ltd., Station Road, Bradley, near Huddersfield, have increased their nominal capital by the addition of £8000 in £1 ordinary shares, beyond the registered capital of £2000.

New Companies Registered

Northern Carbide Co., Ltd. (378,761).—Private company. Capital: £100 in 10s. shares. Manufacturers of and dealers in carbide of calcium, gases, chemicals, etc. Directors: W. D. Bell; W. H. Crosbie. Registered office: 47-59 Gret Street, Newcastle-on-Tyne.

Loma Components, Ltd. (378,581).—Private company. Capital: £200 in 200 shares of £1 each. Manufacturers, importers and exporters of, agents for and wholesale and retail dealers in general engineering plant, mechanical and chemical articles, etc. First director: H. Twersky. Registered office: 111 Cazenove Road, N.16.

M. H. Grist (Plastics), Ltd. (378,714).—Private company. Capital: £1000 in 1000 shares of £1 each. To acquire the business of a merchant and manufacturer of thermoplastic materials carried on by M. H. Grist at Inchbrook, Woodchester, Stroud. Managing director: M. H. Grist. Registered office: Inchbrook, Woodchester, Stroud, Glos.

Birch Fertilisers, Ltd. (378,623).—Private company. Capital: £1000 in 1000 shares

of £1 each. To acquire from John Webber a formula relating to fertilisers, and to carry on the business of manufacturers of chemicals and organic manures, etc. Directors: W. Birch; J. Webber. Registered office: 229 Hagley Road, Edgbaston, Birmingham.

Industrial Scrap Separation, Ltd. (378,904).—Private company. Capital: £100 in 100 shares of £1 each. Merchants and manufacturers of metals, chemicals, raw materials, processed and manufactured goods, industrial products and residuals, fuels, etc. First director: F. Phillips. Registered office: 329 High Holborn, W.C.1.

Hertfordshire Plastic Company, Ltd. (378,613).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers of plastic substances and goods, chemical, electrical, and general engineers, etc., Subscribers: Hertfordshire Rubber Co., Ltd.; J. Entwistle; H. Rose. Solicitors: Cripps, Harries, Hall & Co., 2 Kings Bench Walk, E.C.4.

Loidex (Manchester), Ltd., (378,712).—Private company. Capital: £1000 in £1 shares. Manufacturers of and dealers in adhesives, glues, iron, lead and other metal alloys, cellulose, rubber, oil, resin and synthetic and other compounds etc. Directors: A. Watkin; W. L. John; H. Allen. Registered office: 20 Princess Street, Manchester 2.

Clifford Callwood and Co., Engineers, Ltd. (378,723).—Private company. Capital: £100 in 100 shares of £1 each. To acquire the business of civil, marine and chemical engineers carried on by C. W. L. Callwood, M. Behr and W. P. F. Schindler, at 8 Gardner Avenue, Cricklewood. Directors: C. W. L. Callwood; Mary G. Pearson. Registered office: Albion Mews, Kilburn High Road, N.W.6.

Chemical and Allied Stocks and Shares

IN the continued absence of improvement in demand, reactionary conditions have been in evidence in the industrial and other sections of the Stock Exchange. Nevertheless, declines on balance were mostly moderate, and steady features were not lacking. Imperial Chemical, for instance, have been maintained at 38s. at the time of writing, and Borax Consolidated deferred were steady at 35s., the prevailing assumption being that the forthcoming announcements will show the maintenance of dividends. Following their recent decline, Murex ordinary developed a firmer appearance at 106s. 3d. United Glass Bottle at 61s. 3d. were unchanged, awaiting the financial results, and General Refractories 10s.

ordinary continued to hold their recent improvement to 14s. At 48s. 3d. Courtaulds were little changed prior to the declaration of the interim dividend, while British Celanese and other rayon shares were also fairly well maintained on balance. Calico Printers had a steady appearance at 11s. 9d. pending the preference dividend decision. On the other hand, Wall Paper Manufacturers deferred units reacted further to 34s., and at 85s. 6d. the units of the Distillers Co. were 1s. below the level ruling a week ago.

Birmid Industries recorded a moderate improvement to 82s. 6d., but elsewhere Stewarts & Lloyds, and Tube Investments were slightly lower at 53s. 9d. and 92s. 6d. respectively. In fact, many widely-held shares reflected the reactionary trend on the Stock Exchange, but as far as concerns those connected with the chemical and kindred trades, declines on balance have not exceeded more than a few pence in most cases. British Plaster Board 5s. ordinary went back 3d. to 26s. 9d., Associated Cement were 47s. 6d., and Triplex Glass 31s. 1½d. There was, however, further buying of Dorman Long issues, and the ordinary shares improved to 25s. 6d., awaiting the decision as to a dividend. Fisons were well maintained, dealings up to 45s. having been recorded, and elsewhere B. Laporte remained firm at 78s. "middle," while W. J. Bush continued to be quoted at 50s. Monsanto Chemicals 5½ per cent. first preference kept at 22s. 6d., and Morgan Crucible 5½ per cent. first preference were 26s. 3d. British Drug Houses were again 22s. 6d. Lawes Chemicals 10s. ordinary were around 10s. 6d., and Burt Boulton around 19s. Among shares of companies identified with plastics, British Industrial Plastics 2s. ordinary showed activity up to 5s. 6d. Lacrinoid Products were 4s. 10½d., and Catalin around 3s. 7½d. There was, however, further profit-taking in Thomas De La Rue, which were around 89s. Among other shares, British Emulsifiers 2s. ordinary were 3s. 3d., British Tar Products around 10s., and business at 6s. 9d. was shown in Greiff-Chemicals 5s. ordinary.

Lever & Unilever at 34s. 6d. were 3d. better than a week ago, and United Molasses steady at 29s. 1½d. Metal Box shares were 83s. 9d. and firmly held, it being realised that although the yield is small on the basis of last year's 17½ per cent. dividend, actual earnings on the shares exceeded this rate by 6 per cent. United Steel were 25s. 9d. xd., and Guest Keen 32s. In respect of the year ended March, 1942, the dividend of the latter company was 10 per cent., a conservative payment which allowed £150,000 to be added to reserves. Steadiness was maintained in British Match at 38s. 1½d., and Barry & Staines were 38s. 6d., but Nairn

& Greenwich moved back from 63s. 9d. to 62s. 6d. Cellon 5s. ordinary were again 17s. 3d., and British Glues & Chemicals 4s. ordinary kept at 7s. 6d. Boots Drug 5s. ordinary remained at 40s., Sangers were 21s. 4½d., and Timothy Whites 27s. 7½d. British Aluminium improved slightly to 50s., while British Oxygen were well maintained at 76s. 6d. "Shell," Anglo-Iranian, and other leading oil shares showed a reactionary tendency.

British Chemical Prices

Market Reports

A VERY firm tone continues to be maintained in the industrial chemicals market and reports from nearly all sections indicate a fairly widespread activity. A steady movement into consumption is taking place in most sections, and values throughout continue to display a strong tendency. So far as fresh business is concerned there has been a moderate flow of inquiry, but actual bookings have been rather restricted in some directions owing to the supply position. Among the soda products chlorate of soda is in strong request while an active inquiry is maintained for hyposulphite of soda, nitrate of soda, and caustic soda. There is no change in the position of the potash products, offers of most items being quickly absorbed. Among the miscellaneous chemicals a moderate trade is passing in white acetate of lead, and the lead oxides continue firm at unchanged rates. White powdered arsenic is a good market and a brisk inquiry is reported for British-made formaldehyde. In the coal-tar products market trade on the whole has been of moderate dimensions with contract deliveries for carbolic acid and cresylic acid continuing on steady lines. An active interest is displayed in the benzols and toluols.

MANCHESTER.—Price conditions on the Manchester chemical market during the past week have been extremely firm pretty well throughout the range. Generally, however, values are on a stable basis and though in some instances the tendency is towards higher levels, actual changes on balance have been few and slight. Among tar products there is a steady call for supplies of most varieties of both light and heavy distillates, while among the heavy chemicals, soda products generally are a fairly active section, and offers of the potash materials are being readily taken up. In the acid section oxalic is on the scarce side in relation to needs, hydrochloric is in fair demand, and pressure for sulphuric has been fully maintained.

GLASGOW.—There is no actual change in the position in the Scottish heavy chemical

trade during the past week for both home and export trade, business remaining quite steady. Prices continue to be very firm with no actual changes to report.

Price Changes

Lactic Acid.—Pale tech., 43½% by weight £49 per ton; dark tech., 43¼% by weight, £42 per ton ex works; barrels returnable carriage paid. The reduction in price quoted in our last week's issue should not be taken as having been effective.

Industrial Administration

Conference on Training for Management

A CONFERENCE on training for industrial management is to be held by the Institute of Industrial Administration, at the Waldorf Hotel, London, early next month. The first session of the conference, which will include an address on "Management and the Nation," by the Archbishop of Canterbury, will start at 10 a.m. on March 6. After a short break for luncheon, Mr. A. S. Comyns Carr, K.C., will speak on "Management and Industry." At the second session, from 3 p.m. to 4.30, Mr. H. W. Broadbent, M.Sc., B.Sc., M.I.Chem.E., and Dr. J. A. Bowie, M.A., will speak on aspects of external training for industry. The third session will be from 5.30 p.m. to 7 under the title "Internal Training for Industry." The speakers will be Mr. A. Sanders, F.I.C., M.I.Mech.E., and Mr. Edward Meigh, M.B.E., M.Sc., F.S.G.T. The fourth session, on March 7 (10-11.30 a.m.), under the chairmanship of Lieut.-Col. A. Vaughan Cowell, will be entitled "Management and the Board Room," and will include an address by Mr. Donald McDonald, B.Sc., F.I.C., M.I.Chem.E.

X-RAY ANALYSIS CONFERENCE

The Institute of Physics is arranging a second conference on the analysis of substances and the examination of their behaviour by X-ray diffraction methods to take place in Cambridge on April 9 and 10 next. The provisional programme includes a lecture on "Future Developments in X-Ray Crystallography" by Professor J. D. Bernal, and discussions on "Quantitative Treatment of Powder Photographs," "The Fine Structure of X-Ray Diffraction" and "Fine Broadening." A report is to be presented to the conference on the progress made in the preparation of an Index to X-Ray Diffraction Photographs, for which the Institute has undertaken to be jointly responsible with the American Society for Testing Materials and the American Society for X-Ray and Electron Diffraction.

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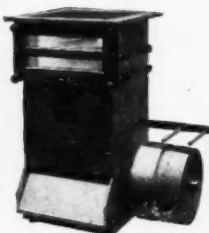
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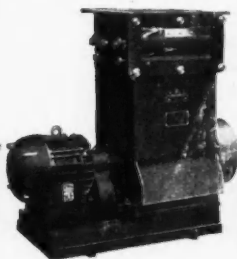
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